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1. A gas discharge laser, comprising:

an enclosure in which laser gas is contained and in which a pair of elongated electrodes are mounted with a discharge area between the electrodes in which laser discharge occurs, the enclosure having a first end with an opening and a second end opposite the first end with an attached mirror, the mirror being located near one end of the discharge area;

a support located outside of the enclosure and attached to the enclosure near the second end, the support having a flange proximate the first end of the enclosure extending inwardly toward the opening in the first end of the enclosure;

a cap disposed between the flange and the first end of the enclosure, the cap having an aperture covered with an attached output coupler located near another end of the discharge area opposite the mirror, the cap being movable relative to the flange and the first end of the enclosure;

a flexible seal between the first end of the enclosure and the cap; and

at least one adjustment device connected to the flange and contacting the cap to adjustably position the cap so as to align the output coupler with the mirror for optimum performance of the laser, the flexible seal accommodating adjustment of the cap without compromising integrity of the seal.

2. The laser of claim 1, wherein the support is spaced from the enclosure to enhance thermal isolation between the support and the enclosure.

3. The laser of claim 1, wherein the support is a pair of rails disposed on opposite sides of the enclosure.

4. The laser of claim 1, wherein the support has a low coefficient of thermal expansion longitudinally.

5. The laser of claim 4, wherein the support is made of Invar.

6. The laser of claim 4, wherein the support is made of carbon fiber composite.

7. The laser of claim 1, wherein the at least one adjustment device comprises at least one screw threadably engaged with the flange.

8. The laser of claim 1, wherein the flexible seal is a metal bellows.

9. The laser of claim 1, wherein the flexible seal is an elastomeric gasket and the at least one adjustment device pushes the cap toward the first end of the enclosure to sufficiently compress the flexible seal to prevent the gas contained in the enclosure from leaking past the seal.

10. The laser of claim 1, wherein distance between the mirror and the output coupler is less than 30 cm.

11. The laser of claim 1, wherein the output coupler has a reflectivity greater than about 97 percent.

12. The laser of claim 1, wherein the output coupler has a reflectivity such that a lasing threshold produced on a gain curve is sufficiently low on the gain curve so that operational bandwidth of the laser approaches its free spectral range, thereby increasing stability of the laser.

13. The laser of claim 1, wherein the enclosure has an interior divided into two portions by the electrodes mounted opposite each other therein, the electrodes being in contact with the laser gas, the laser gas being contained in the portions of the interior of the enclosure to provide a gas ballast for the laser.

14. The laser of claim 13, wherein the electrodes have a width and a gap distance between them, the electrode width being sufficiently less than the gap distance so that the laser discharge supports only a fundamental transverse mode in a stable resonator.

15. The laser of claim 13, wherein the enclosure has an internal structure with increased surface area to enhance heat transfer from the laser gas into the enclosure.

16. The laser of claim 15, wherein the internal structure is a plurality of fins.

17. The laser of claim 15, wherein the internal structure is foam aluminum.

18. The laser of claim 1, wherein the enclosure contains a discharge tube disposed between the electrodes and made of low loss dielectric material, the laser discharge occurring in the discharge tube, the electrodes being external to the discharge tube and not in physical contact with the laser discharge they generate.

19. The laser of claim 18, wherein the enclosure contains at least one gas reservoir in fluid communication with the discharge tube to provide gas ballast for the laser.

20. The laser of claim 19, wherein the gas reservoir comprises two tubes disposed on opposite sides of the discharge tube.

21. The laser of claim 20, wherein the electrodes are the two tubes.

22. The laser of claim 19, wherein the gas reservoir contains molecular sieves holding a high concentration of CO_2 for the gas ballast.

23. The laser of claim 19, wherein the first end of the enclosure comprises a first combiner block to which the gas reservoir and discharge tube are sealably attached and which provides the fluid communication between the gas reservoir and the discharge tube.

24. The laser of claim 23, wherein the second end of the enclosure comprises a second combiner block to which the discharge tube is sealably attached.

25. The laser of claim 24, wherein the second combiner block is sealably attached to the gas reservoir and provides fluid communication between the gas reservoir and the discharge tube.

26. The laser of claim 23, wherein the discharge tube is sealed to the combiner block with a flexible seal.

27. The laser of claim 23, wherein the combiner block has a gas fill port in fluid communication with the gas reservoir which provides for laser gas to be put into the gas reservoir.

28. The laser of claim 18, wherein both elongated electrodes are divided into portions along their length, each portion being driven by a separate amplifier module.

29. The laser of claim 1, further comprising an inductor connected between the electrodes and a RF driver connected directly to one of the electrodes and to the other electrode through the inductor, wherein the circuit electrically resonates within 0.5 MHz of the RF driver frequency.

30. The laser of claim 1, wherein the laser gas has a working component that is CO_2.

31. The laser of claim 1, wherein the laser gas has a working component that is CO.

32. (amended) A gas discharge laser, comprising:

a discharge tube made of low loss dielectric material and containing laser gas, the discharge tube having a first end and a second end;

a pair of electrodes located adjacent to and outside of the discharge tube and disposed on opposite sides of it, the electrodes causing a laser discharge to occur in the tube, the electrodes not in physical contact with the laser discharge;

an output coupler located near the first end of the discharge tube and flexibly sealed to the discharge tube with an elestomeric seal; and

a mirror located near the second end of the discharge tube, to form a laser cavity along the inside of the discharge tube between the mirror and the output coupler.

33. The laser of claim 32, wherein the output coupler is positionally adjustable relative to the mirror to optimize the laser performance.

34. The laser of claim 32, wherein the electrodes are in a non-evacuated environment.

35. The laser of claim 32, wherein the electrodes are made of copper.

36. A gas discharge laser, comprising:
an enclosure containing;
a) a discharge tube made of low loss dielectric material and containing laser gas, the discharge tube having a first end and a second end;
b) a pair of electrodes located adjacent to and outside of the discharge tube and disposed on opposite sides of it, the electrodes causing a laser discharge to occur in the tube, the electrodes not in physical contact with the laser discharge;
c) at least one gas reservoir in fluid communication with the discharge tube, the gas reservoir containing laser gas to provide gas ballast for the laser;
d) the enclosure having a first end with an opening and a second end opposite the first end with an attached mirror, the mirror being located near one end of the discharge area;
a support located outside of the enclosure and attached to the enclosure near the second end, the support having a flange proximate the first end of the enclosure extending inwardly toward the opening in the first end of the enclosure;
a cap disposed between the flange and the first end of the enclosure, the cap having an aperture covered with an attached output coupler located near another end of the discharge area opposite the mirror, the cap being movable relative to the flange and the first end of the enclosure;
a flexible seal between the first end of the enclosure and the cap; and
at least one adjustment device connected to the flange and contacting the cap to adjustably position the cap so as to align the output coupler with the mirror for optimum performance of the laser, the flexible seal accommodating adjustment of the cap without compromising integrity of the seal.

37. A gas discharge laser, comprising:

an enclosure in which laser gas is contained and in which a pair of elongated electrodes are mounted with a discharge area between the electrodes in which laser discharge occurs, the enclosure having a first end with an opening and a second end opposite the first end with an attached mirror, the mirror being located near one end of the discharge area, the enclosure having an interior divided into two portions by the electrodes mounted opposite each other therein, the electrodes being in fluid communication with each other across the discharge area, the laser gas being contained in the portions of the interior of the enclosure to provide a gas ballast for the laser;

a support located outside of the enclosure and attached to the enclosure near the second end, the support having a flange proximate the first end of the enclosure extending inwardly toward the opening in the first end of the enclosure;

a cap disposed between the flange and the first end of the enclosure, the cap having an aperture covered with an attached output coupler located near another end of the discharge area opposite the mirror, the cap being movable relative to the flange and the first end of the enclosure;

a flexible seal between the first end of the enclosure and the cap; and

at least one adjustment device connected to the flange and contacting the cap to adjustably position the cap so as to align the output coupler with the mirror for optimum performance of the laser, the flexible seal accommodating adjustment of the cap without compromising integrity of the seal.

38.(amended) A method of constructing a gas discharge laser, comprising the steps of:

supporting a discharge tube made of dielectric material between a mirror and an output coupler so as to form a sealed laser cavity between the mirror and the output coupler along the inside of the discharge tube, the output coupler being flexibly sealed to the discharge tube with an elastomeric seal;

mounting a pair of electrodes adjacent to and outside of the discharge tube and disposed on opposite sides of it so that a laser discharge occurs in the tube, the electrodes being not in physical contact with the laser discharge; and

evacuating the laser cavity and then installing laser gas into it.